

1. A field emission device comprising an emitter tip formed from and integral with an emitter layer, the emitter tip having a height and including a base and an apex, wherein said emitter tip has a substantially rectilinear profile between said base and said apex, said substantially rectilinear profile being defined by a tip arc length and a tip chord length, wherein the ratio of said arc length to said chord length is less than or equal to about 1.2:1.

2. A field emission device according to claim 1, wherein the ratio of said tip arc length to said tip chord length is less than or equal to about 1.1:1.

3. A field emission device according to claim 1, wherein the ratio of said tip arc length to said tip chord length is less than or equal to about 1.05:1.

4. A field emission device according to claim 1, wherein the ratio of said tip arc length to said tip chord length is less than or equal to about 1.01:1.

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5. A field emission device comprising:

an emitter layer including an emitter tip that has a height and including a base and an apex, wherein said emitter tip has a rectilinear profile between said base and said apex that is defined by a tip arc length and a tip chord length, wherein the ratio of said arc length to said chord length is less than or equal to about 1.2:1;

a substrate; and

a cathode conductive layer disposed over said substrate, said emitter tip being disposed over said cathode conductive layer.

6. A field emission device according to Claim 5, further comprising:

a conductive gate structure disposed over said cathode conductive layer;

an aperture through said conductive gate structure, said emitter tip being exposed within said aperture; and

an anode panel positioned over said conductive gate structure and said emitter tip.

7. A field emission device according to Claim 6, wherein said anode plane comprises:

an anode conductive layer;

a phospholuminescent panel for emitting light upon being excited by electrons; and

a transparent panel.

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8. A flat panel display device comprising:
 - a substrate;
 - a cathode conductive layer disposed over said substrate;
 - an array of emitter tips each formed from an emitter layer disposed over said substrate, each of said emitter tips having a height and including a base and an apex, each of said emitter tips having a substantially rectilinear profile between said base and said apex that is defined by a tip arc length and a tip chord length, wherein the ratio of said arc length to said chord length is less than or equal to about 1.2:1;
 - a conductive gate structure disposed over said cathode conductive layer;
 - an array of apertures formed through said conductive gate structure, each of said emitter tips being exposed through one of said apertures; and
 - an anode panel for emitting light in response to electrons emitted from said array of emitter tips.

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9. A field emission device comprising:
a substrate;
a cathode conductive layer disposed over said substrate; and
an emitter tip integral with an emitter layer disposed over said cathode
conductive layer and having a base, an apex, and a continuously concave exterior
surface extending from the base to the apex.

10. A field emission device according to Claim 9, further comprising:
a conductive gate structure disposed over said cathode conductive layer;
an aperture through said conductive gate structure, said emitter tip being
exposed within said aperture; and
an anode panel positioned over said conductive gate structure and said emitter
tip.

11. A field emission device according to Claim 10, wherein said anode panel
comprises:
an anode conductive layer;
a phospholuminescent panel for emitting light upon being excited by
electrons; and
a transparent panel.

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FOOTNOTES

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12. A field emission device comprising:
a substrate;
a cathode conductive layer disposed over said substrate; and
an emitter tip projecting from and integral with an emitter layer disposed over said cathode conductive layer and having a base, an apex, and an exterior surface, said exterior surface having a substantially paraboloid vertical profile that extends from the base to the apex.

13. A field emission device according to Claim 12, further comprising:
a conductive gate structure disposed over said cathode conductive layer;
an aperture through said conductive gate structure, said emitter tip being exposed within said aperture; and
an anode panel positioned over said conductive gate structure and said emitter tip.

14. A field emission device according to Claim 13, wherein said anode panel comprises:
an anode conductive layer;
a phospholuminescent panel for emitting light upon being excited by electrons; and
a transparent panel.

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15. A field emission device comprising:

a substrate;

a cathode conductive layer disposed over said substrate; and

an emitter tip that is an integral portion of a single emitter layer disposed over said cathode conductive layer and having a base, an apex, and an exterior surface, said exterior surface having an ovoid profile that extends from the base to the apex.

16. A field emission device according to Claim 15, further comprising:

a conductive gate structure disposed over said cathode conductive layer;

an aperture through said conductive gate structure, said emitter tip being exposed within said aperture; and

an anode panel positioned over said conductive gate structure and said emitter tip.

17. A field emission device according to Claim 16, wherein said anode panel comprises:

an anode conductive layer;

a phospholuminescent panel for emitting light upon being excited by electrons; and

a transparent panel.

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18. A field emission device comprising an emitter tip formed from an emitter layer, the emitter tip having a height and including a base and an apex, wherein said emitter tip is generally conical and has a substantially rectilinear profile between said base and said apex.

19. A field emission device according to Claim 18, wherein said substantially rectilinear profile is defined by a tip arc length and a tip chord length, wherein the ratio of said arc length to said chord length is less than or equal to about 1.2:1.

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- 1 20. A flat panel display device comprising:
- 2 a substrate;
- 3 a cathode conductive layer disposed over said substrate;
- 4 an array of emitter tips formed as a part of an emitter layer disposed over said
- 5 substrate, each of said emitter tips having a height and including a base and an apex,
- 6 each of said emitter tips having an exterior surface, said exterior surface having a
- 7 profile with a continuous shape that extends from the base to the apex, said
- 8 continuous shape being selected from the group consisting of a concave shape, a
- 9 substantially paraboloid shape, and an ovoid shape;
- 10 a conductive gate structure disposed over said cathode conductive layer;
- 11 an array of apertures formed through said conductive gate structure, each of
- 12 said emitter tips being exposed through one of said apertures; and
- 13 an anode panel for emitting light in response to electrons emitted from said
- 14 array of emitter tips.
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